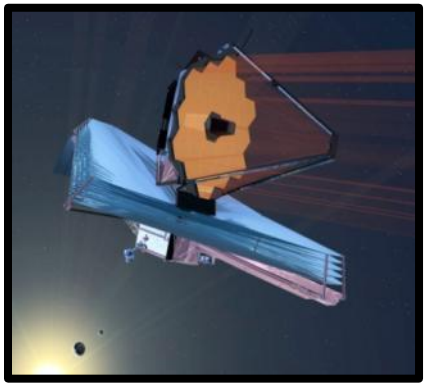
NASA Engineering and Safety Center's 10th Anniversary



Ask Questions, Find Help

Audience interaction

- **Links** - link to related reference materials
- **Share presentation** - email a presentation link bookmarked to play from a specific point
- **Polls**
- **Ask a question**

10 Years and Counting - The NASA Engineering and Safety Center

Engineering Excellence

Ralph Roe, Director of the NASA Engineering and Safety Center (NESC)

Abstract: The NASA Engineering and Safety Center (NESC) was established in 2003 to address a concern raised by Admiral Gehman, the Columbia Accident Investigation Board Chairman, that NASA lacked a strong program-independent resource to provide programs an alternate perspective on difficult technical issues. The NESC fills this need by bringing together technical experts from across NASA, industry, other government agencies and academia and leveraging their expertise to solve problems.

Ten years after the Columbia tragedy it is human nature to begin to forget the important lessons learned from such an event. We should periodically remind ourselves of these lessons and continue to be ever vigilant in the pursuit of the Agency's missions. NASA's long successful history is grounded in a few fundamental safety tenets that are just as relevant today as they were 50 years ago. This presentation will describe the factors that led to the creation of the NESC and the principles on which the organization was formed.

Overview of Discussion

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- ✓ Reflections on Columbia lessons learned
- ✓ Why the NESC was formed
- ✓ NASA's safety tenets
- ✓ Overarching principles of a strong safety culture
- ✓ NESC framework

Columbia Lessons Learned

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- ✓ It is human nature that the farther we get from the Columbia tragedy the more we tend to forget
- ✓ It is important to engage our teams in discussions to remember our critical lessons learned
- ✓ We need to start by remembering the crew of Columbia

STS-107 Crew

Understanding the Environment

Today's environment is similar

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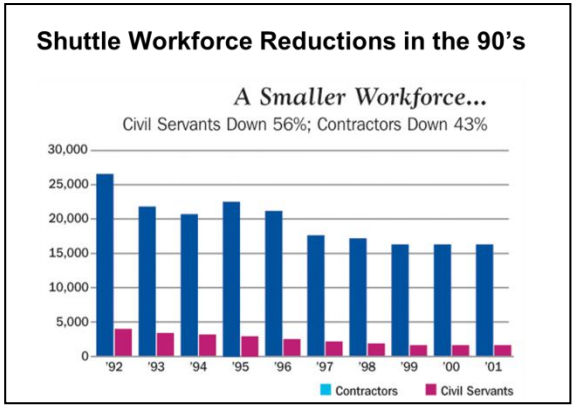
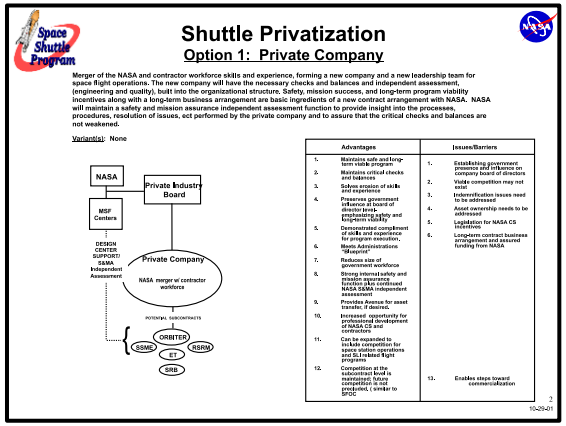
- ✓ There will always be schedule pressure
- ✓ There will always be budget pressure
- ✓ There will always be technical challenges





Observations of the Columbia Accident Investigation Board

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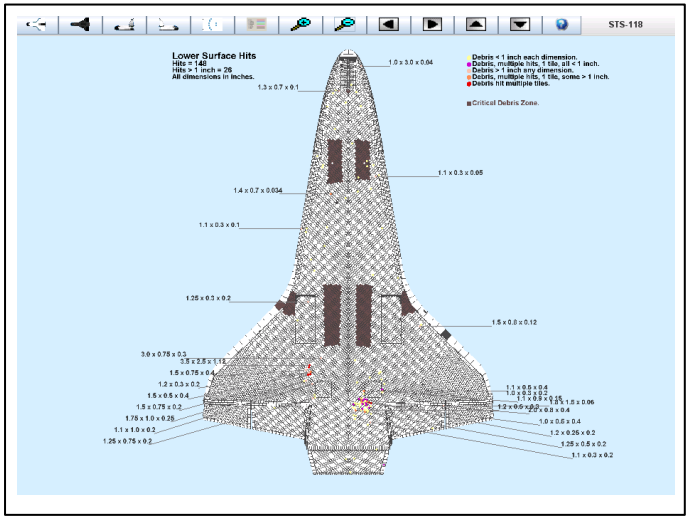
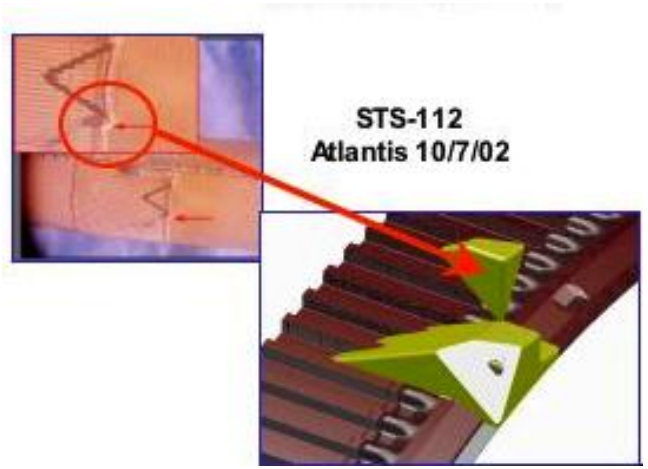
- ✓ Normalization of Deviance
  - Referenced from Diane Vaughn's book *"The Challenger Launch Decision: Risky Technology, Culture, and Deviance at NASA (1996)"*



- ✓ Shuttle Program was complacent because of its success and was too insular

- ✓ Broken safety culture



Observations of the Columbia Accident Investigation Board

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- ✓ NESC was established in July 2003 in response to the Columbia accident, specifically:
  - *Admiral Gehman's assertion that, "There's no there, there"*

NASA's Safety Tenets

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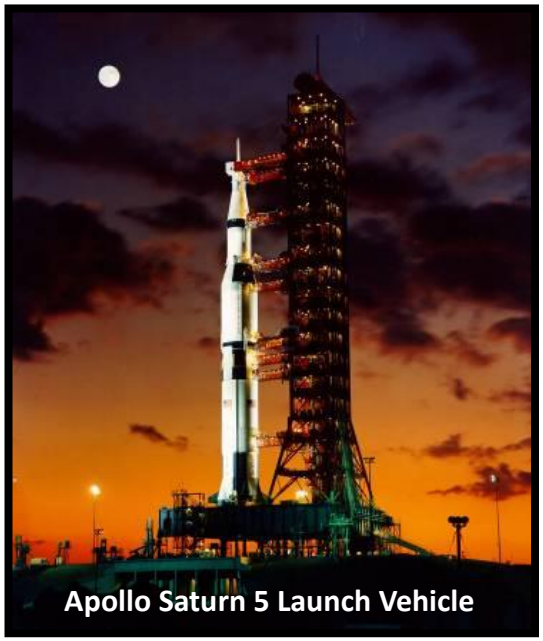
1. Strong in-line checks and balances

2. Healthy tension between responsible organizations

3. "Value-added" independent assessment



Apollo Saturn 5 Launch Vehicle

Creating a Strong Safety Culture

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- ✓ While the 3 safety tenets are necessary for safe and successful programs, they alone are not sufficient

- ✓ Overarching principles create the right environment for a strong safety culture

  1. Develop relationships for an open and trusting environment
  2. Create diverse teams
  3. Focus on engineering excellence
  4. Share knowledge and experience
  5. Recognize those who demonstrate a commitment to a strong safety culture

Principle #1 – Develop Relationships

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- ✓ Establish and build strong relationships across the team
  - The tendency is to over work the technical and neglect the personal relationship side of the project
  - Strong working relationships will allow the team to work through the difficult issues in an open, non-threatening environment

Principle #2 – Create Diverse Teams

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- ✓ Diverse perspectives allow for more robust solutions
- ✓ Work in an integrated, badgeless team environment
  - Define interfaces based on system design, not Centers or locations
  - Build integrated teams based on expertise, not location
- ✓ The NESC model uses matrix teams of experts from all NASA Centers, industry, academia and other government agencies
  - Technical Discipline Teams (TDTs)
  - Assessment teams

Principle #3 – Focus on Engineering Excellence

- ✓ Engineering excellence comes from the appropriate levels of:
  - Technical rigor
  - Independent reviews
  - Processes
    - Focus on the intent of the processes not the process itself
    - Even rapid prototype development projects require proper project documentation and configuration control
    - Adjust processes and procedures according to the project's lifecycle stage

Principle #4 – Share Knowledge and Experience

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- ✓ Document results of assessments, testing and analysis
- ✓ Share new knowledge gained through testing and analysis
  - NESC Technical Bulletins
  - Lessons Learned
- ✓ Share experiences through spoken word and story telling
  - NESC Virtual Academy

    nescacademy.nasa.gov

Principle #4 – Share Knowledge and Experience

Train the Next Generation

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- ✓ Opportunity for early-career participants to gain hands on experience working with NESC technical experts and leaders
- ✓ Connects senior engineers to a younger generation that offers a fresh perspective to technical activities
- ✓ Provides a technically diverse learning experience outside of the participant's home organization

Principle #5 – Recognize Strong Safety Culture

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- ✓ Reinforce the safety culture by recognizing and rewarding the behavior that demonstrates a commitment to safety and engineering excellence

2012 NESC Honor Award Recipients

Summary

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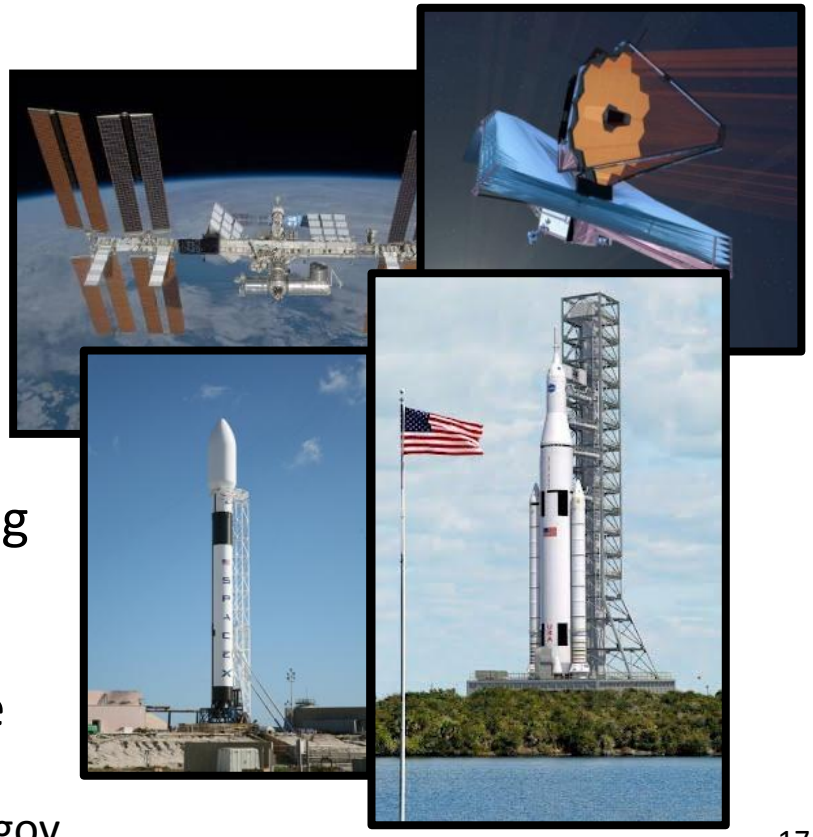
- ✓ Remember our STS-107 Crew and discuss the lessons learned from Columbia
- ✓ The environment prior to Columbia is not very different from the environment today
- ✓ Maintain NASA's safety tenets:
  - *Strong in-line checks and balances*
  - *Healthy tension between responsible organizations*
  - *"Value-added" independent assessments*
- ✓ Create the right environment for a strong safety culture in all of our programs
- ✓ NESC is a resource available to everyone



www.nesc.nasa.gov

Q&A

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- ✓ Questions?

Upcoming Webcast

Engineering Excellence

Date: July 10, 2013

Presenter: Sandra Smalley

Director, Engineering and Program Management Division, OCE

Topic: Effective Collaboration With External Stakeholders